

PROCEEDINGS
OF THE
AMERICAN SOCIETY
OF
CIVIL ENGINEERS

VOL. XXXVII—No. 3

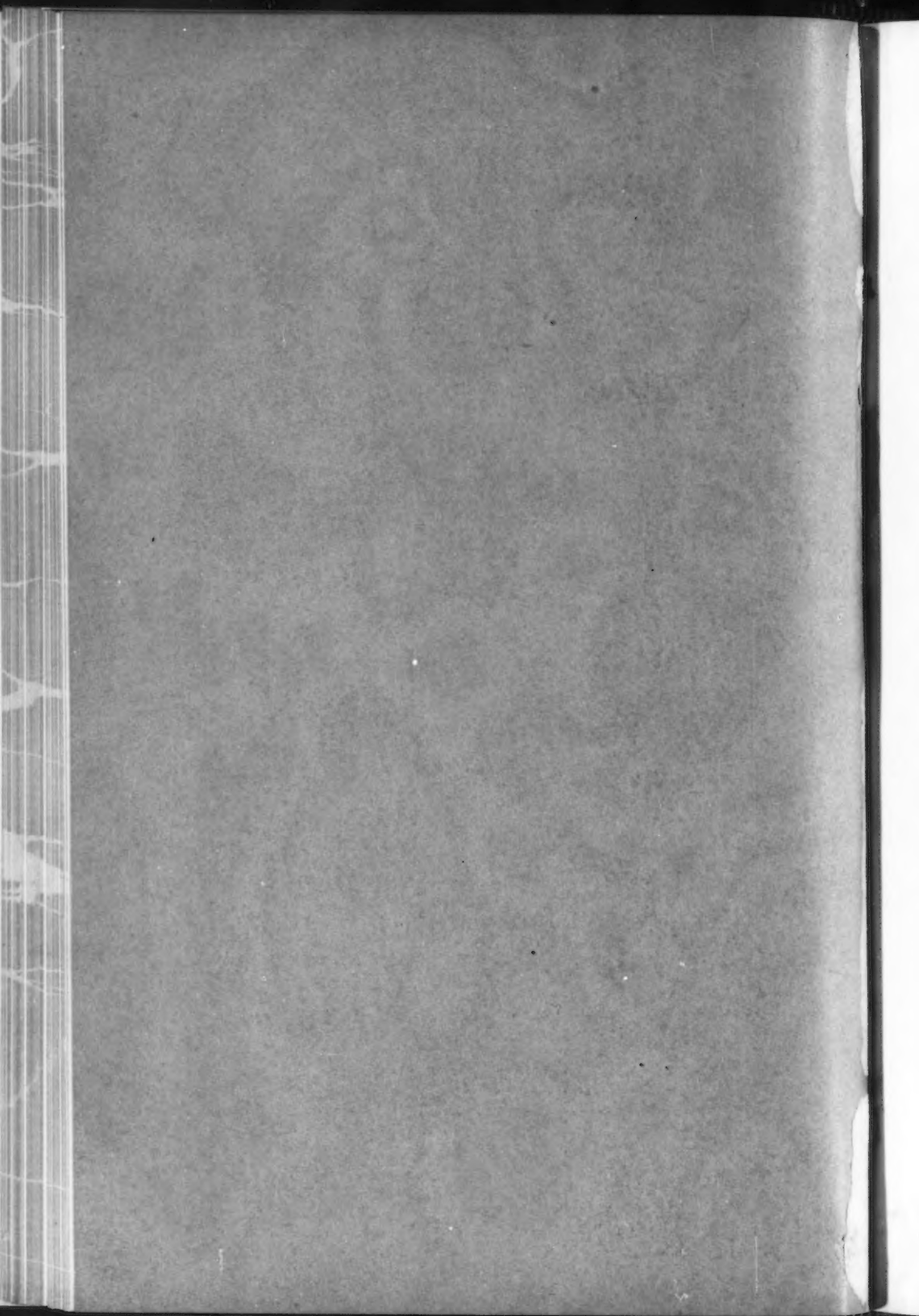


March, 1911



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PROCEEDINGS
OF THE
AMERICAN SOCIETY
OF
CIVIL ENGINEERS
(INSTITUTED 1852)

VOL. XXXVII—No. 3
MARCH, 1911

Edited by the Secretary, under the direction of the Committee on Publications.

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NEW YORK 1911.

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American Society of Civil Engineers

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Term expires January, 1913:

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CHARLES L. STROBEL

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1912:

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ON STEEL COLUMNS AND STRUTS: Austin L. Bowman, Alfred P. Boller, Emil Gerber, Charles F. Loweth, Ralph Modjeski, Frank C. Osborn, George H. Pegram, Lewis D. Rights, George F. Swain, Emil Swensson, Joseph R. Worcester.

ON BITUMINOUS MATERIALS FOR ROAD CONSTRUCTION: W. W. Crosby, A. W. Dean, H. K. Bishop, A. H. Blanchard.

The House of the Society is open from 9 A. M. to 10 P. M. every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

HOUSE OF THE SOCIETY—220 WEST FIFTY-SEVENTH STREET, NEW YORK.

TELEPHONE NUMBER.....5913 Columbus.
CABLE ADDRESS....."Ceas, New York."

*Elected Vice-President, February 28th, 1911, to fill the vacancy caused by the death of John T. Fanning.

†Mr. Talbot was elected Vice-President, February 28th, 1911, and Mr. Flad was elected Director to fill the unexpired term.

AMERICAN SOCIETY OF CIVIL ENGINEERS

INSTITUTED 1852

PROCEEDINGS

This Society is not responsible, as a body, for the facts and opinions advanced in any of its publications.

SOCIETY AFFAIRS

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MINUTES OF MEETINGS OF THE SOCIETY

February 15th, 1911.—The meeting was called to order at 8.30 P. M.; A. L. Bowman, M. Am. Soc. C. E., in the chair; T. J. McMinn, Assistant Secretary, acting as Secretary; and present, also, 95 members and 16 guests.

A paper by E. D. Hardy, M. Am. Soc. C. E., entitled "Water Purification Plant, Washington, D. C., Results of Operation," was presented by the Assistant Secretary, who also read a discussion on the subject by Allen Hazen, M. Am. Soc. C. E. The subject was discussed orally by George A. Johnson, Assoc. M. Am. Soc. C. E.

The Assistant Secretary announced the following deaths:

JOHN THOMAS FANNING, Vice-President, Am. Soc. C. E., elected Member, August 7th, 1872; died February 6th, 1911.

EVELYN PIERREPONT ROBERTS, elected Member, May 7th, 1884; died December 30th, 1910.

LOUIS EDWIN HAWES, elected Associate Member, September 2d, 1896; died January 29th, 1911.

GEORGE WILLIAM LEE, elected Junior, March 4th, 1902; Associate Member, January 2d, 1907; died January 6th, 1911.

FRIDTHJOF LAURITZ MARTIN TÖNNESEN, elected Associate Member, June 3d, 1908; date of death unknown.

Adjourned.

March 1st, 1911.—The meeting was called to order at 8.30 P. M.; President Endicott in the chair; Chas. Warren Hunt, Secretary; and present, also, 173 members and 24 guests.

The minutes of the Annual Meeting, January 18th, and of the meeting of February 1st, 1911, were approved as printed in *Proceedings* for February, 1911.

The President appointed Messrs. Edward W. Bush, R. D. Coombs, and George S. Frost Tellers to canvass the ballot on the following proposed amendment to the Constitution:

Amend Article IV as follows:

Add at the end of Article IV, the following:

"13. Corporate Members and Associates who have reached the age of seventy years, and who have paid dues as such for twenty-five years, shall be exempt from further dues. Corporate Members and Associates who have paid dues as such for thirty-five years shall be exempt from further dues."

A paper entitled "The Pittsburg and Lake Erie Cantilever Bridge Over the Ohio River, at Beaver, Pa.," by Albert R. Raymer, M. Am. Soc. C. E., was presented by the author, and illustrated with lantern slides. The paper was discussed orally by F. W. Skinner, M. Am. Soc. C. E., who also illustrated his remarks with lantern slides. A written discussion by C. W. Hudson, M. Am. Soc. C. E., was presented by the Secretary.

The Tellers reported as follows:

"On the adoption of the amendment to Article IV, relating to the Exemption from Further Dues of Corporate Members and Associates of Certain Ages:

Total number of ballots received.....	2 312
Without signature.....	28
Not entitled to vote.....	9
Defective	7
	<hr/> 44
Counted.....	2 268
No	39
Yes	2 229
	<hr/> 2 268."

The necessary affirmative vote of two-thirds of all ballots cast having been received, the President declared the amendment carried.

The Secretary announced the election of the following candidates on February 28th, 1911:

AS MEMBERS.

CHARLES DANIEL SARGENT, Cornwall, Ont., Canada.
JOHN CHARLES THOMAS, Wellsville, Ohio.

AS ASSOCIATE MEMBERS.

JOHN GUNERIUS ANDERSON, Minneapolis, Minn.
JOHN ARRINGTON, Atlanta, Ga.
GUY BOSCHKE, Portland, Ore.
JAMES LAWRENCE BROWNLEE, Celilo, Ore.
HANS LANGSTED CHRISTIE, Ambridge, Pa.
WALES SMITH COLLINS, Brogan, Ore.
HENRY EDWIN COWAN, St. Augustine, Fla.
HARRY JAMES COWIE, Niagara Falls, N. Y.
FLOYD GOSSETT DESSERTY, Los Angeles, Cal.
EDWIN MONTAGUE EVANS, Philadelphia, Pa.
RALPH HERBERT FIFIELD, Malta, Mont.
EDWARD THOMAS FLAHERTY, Los Angeles, Cal.
CLARENCE HOARD, Victoria, B. C., Canada.
CHARLES ALEXANDER HOLDEN, Mt. Vernon, N. Y.
OLIVER ZELL HOWARD, Annapolis, Md.
CLEVES HARRISON HOWELL, Keokuk, Iowa.
JESSE AARON JACKSON, Seattle, Wash.
CHARLES JOHNSON, New Orleans, La.
JULIUS STEPHEN KUNKEL, Tampico, Mexico.
PERCY REMINGTON LEETE, Bridgeport, Conn.
JOHN ROBERT CLARKE MACREDIE, Outlook, Sask., Canada.
SAM LYON MCGLATHERY, Manila, Philippine Islands.
HENRY LESTER NEWHALL, New Paltz, N. Y.
EDWARD HERBERT PENSE, Ottawa, Ont., Canada.
GEORGE THOMAS PETHERAM, Hanford, Wash.
WILBUR COLLINS RALEIGH, Tacoma, Wash.
WILLIAM THOMAS REED, Boston, Mass.
JOHN WINFIELD REID, Chicago, Ill.
FRANK WILLIAM SAUNDERS, Celilo, Ore.
HOWARD LEWDEN SAWYER, Chicago, Ill.
JOHN PATRICK TURNER, Amsterdam, N. Y.

AS ASSOCIATES.

CHARLES WILLIAM CORBALEY, Los Angeles, Cal.
OLIVER PERRY MORTON GOSS, Madison, Wis.
CHARLES WILSON ROSS, West Newton, Mass.

AS JUNIORS.

THOMAS SHERWOOD BAILEY, Schenectady, N. Y.
ARTHUR FREDERICK BLIGHT, Denver, Colo.
RALPH McLANE BOWMAN, Ithaca, N. Y.
CLARENCE COWGILL BROWN, St. Louis, Mo.
JAMES WILHELM CARPENTER, Cleveland, Ohio.
DANIEL ELIAS DAVIS, Alliance, Ohio.
HARRY RIDDEL HAYES, New York City.
GEORGE W CASS LIGHTNER, Detroit, Mich.
JAMES PIERRE SEAMAN, Weehawken, N. J.
THOMAS EDWARD SNOOK, JR., New York City.
RAYMOND PHILIP WEIDENFELLER, Des Moines, Iowa.
ALFRED DANIEL WOLFF, JR., New York City.
HARLAND CLARK WOODS, Boulder, Colo.

The Secretary announced the transfer of the following candidates on February 28th, 1911:

FROM ASSOCIATE MEMBER TO MEMBER.

THOMAS WHITE COTHRAN, Greenwood, S. C.
ROBERT GEORGE DIECK, Portland, Ore.
MARSHALL ORA LEIGHTON, Washington, D. C.
THERON MONROE RIPLEY, Fulton, N. Y.
RUDOLF VIEDT ROSE, Niagara Falls, N. Y.
LEONARD SEWALL SMITH, Madison, Wis.
CLINTON DRAPER THURBER, North Chicago, Ill.
EUGENE TRUE THURSTON, JR., San Francisco, Cal.

FROM JUNIOR TO ASSOCIATE MEMBER.

CHESTER ROBERT CHADWICK, New York City.
HARRY MINOTT GOODMAN, Honolulu, Hawaii.
ALBERT PAUL HANEY, St. Louis, Mo.
JULIUS LILIEN JACOBS, Houston, Tex.
JULIO DANIEL MONTERO, Santiago de Cuba, Cuba.
ROSS MILTON RIEGEL, New York City.
ARTHUR CLARENCE TOZZER, Brooklyn, N. Y.

FROM JUNIOR TO ASSOCIATE.

CHARLES LEOPOLD WALKER, Ithaca, N. Y.

The Secretary announced the following deaths:

JOHN FRANKLIN HINCKLEY, elected Member, May 6th, 1885; died February 20th, 1911.

EDWIN MERRITT HOLMES, elected Junior, March 31st, 1903; Associate Member, January 2d, 1907; died February 11th, 1911.

The Secretary announced that the Forty-third Annual Convention of the Society will be held at Chattanooga, Tenn., June 13th to 16th, 1911, inclusive.

Adjourned.

OF THE BOARD OF DIRECTION

(Abstract)

February 28th, 1911.—President Endicott in the chair, Chas. Warren Hunt, Secretary; and present, also, Messrs. Bates, Clarke, Kimball, Loomis, Ridgway, Snow, Strobel, Stuart, Talbot, and Thompson.

Under the Constitution, Arthur N. Talbot, Director, representing District No. 5, became a Vice-President, taking the place of the late John T. Fanning, who died February 6th, 1911.

Edward Flad, of St. Louis, Mo., was elected a Director representing District No. 5 to fill the unexpired term of Arthur N. Talbot.

Action was deferred until the next meeting on the proposition to appoint a Special Committee to report on the valuation of public utilities property.

The resignation of Charles Hansel, M. Am. Soc. C. E., as a member of the Special Committee on Engineering Education, was received and accepted.

Ballots for membership were canvassed, resulting in the election of 2 Members, 31 Associate Members, 3 Associates, and 13 Juniors, and the transfer of 7 Juniors to the grade of Associate Member, and 1 Junior to the grade of Associate.

Eight Associate Members were transferred to the grade of Member. Applications were considered, and other routine business transacted.

Adjourned.

ANNOUNCEMENTS

The House of the Society is open from 9 A. M. to 10 P. M., every day, except Sundays, Fourth of July, Thanksgiving Day, and Christmas Day.

FUTURE MEETINGS

April 5th, 1911.—8.30 P. M.—At this meeting a paper by Leonard Metcalf and John W. Alvord, Members, Am. Soc. C. E., entitled "The Going Value of Water-Works," will be presented for discussion.

This paper was printed in *Proceedings* for February, 1911.

April 19th, 1911.—8.30 P. M.—A paper by James E. Howard, Esq., entitled "Some Tests of Large Steel Columns," will be presented for discussion.

This paper was printed in *Proceedings* for February, 1911.

May 3d, 1911.—8.30 P. M.—At this meeting a paper by John P. Hogan, Jun. Am. Soc. C. E., entitled "Sinking a Wet Shaft," will be presented for discussion.

This paper is printed in this number of *Proceedings*.

May 17th, 1911.—8.30 P. M.—A paper by Charles Arthur Hague, M. Am. Soc. C. E., entitled "The Present-Day Pumping Engine for Water-Works," will be presented for discussion.

This paper is printed in this number of *Proceedings*.

ANNUAL CONVENTION

The Forty-third Annual Convention of the Society will be held at Chattanooga, Tenn., June 13th to 16th, 1911, inclusive.

SEARCHES IN THE LIBRARY

In January, 1902, the Secretary was authorized to make searches in the Library, upon request, and to charge therefor the actual cost to the Society for the extra work required. Since that time many searches have been made, and bibliographies and other information on special subjects furnished.

The resulting satisfaction, to the members, who have made use of the resources of the Society in this manner, has been expressed frequently, and leaves little doubt that, if it were generally known to the membership that such work would be undertaken, many would avail themselves of it.

The cost is trifling compared with the value of the time of an engineer who looks up such matters himself, and the work can be performed quite as well, and much more quickly, by persons familiar with the Library.

In asking that such work be undertaken, members should specify clearly the subject to be covered, and whether references to general books only are desired, or whether a complete bibliography, involving search through periodical literature, is desired.

In reference to this work, the Appendices* to the Annual Reports of the Board of Direction for the years ending December 31st, 1906, and December 31st, 1910, contain summaries of all searches made to date.

PAPERS AND DISCUSSIONS

Members and others who take part in the oral discussion of the papers presented are urged to revise their remarks promptly. Written communications from those who cannot attend the meetings should be sent in at the earliest possible date after the issue of a paper in *Proceedings*. The issue of volumes of *Transactions* is dependent on the closing of discussions, and the co-operation of the membership in this matter is essential to the regular issue of each quarterly volume.

All papers accepted by the Publication Committee are classified by the Committee with respect to their availability for discussion at meetings.

Papers which, from their general nature, appear to be of a character suitable for oral discussion, will be published as heretofore in *Proceedings*, and set down for presentation to a future meeting of the Society, and, on these, oral discussions, as well as written communications, will be solicited.

All papers which do not come under this heading, that is to say, those which, from their mathematical or technical nature, in the opinion of the Committee, are not adapted to oral discussion, will not be scheduled for presentation to any meeting. Such papers will be published in *Proceedings* in the same manner as those which are to be presented at meetings, but written discussions, only, will be requested for subsequent publication in *Proceedings* and with the paper in the volumes of *Transactions*.

SUBSCRIPTION PRICE TO THE PUBLICATIONS OF THE SOCIETY

The following subscription rates have been fixed by the Board of Direction for the publications of the Society:

Proceedings, ten Numbers per annum, \$8. Price for single numbers, \$1.

Transactions, four Volumes per annum, \$12. Price for single volumes, \$4.

On the above prices there is a discount of 25% to members who desire extra copies of any of these publications, to Libraries, and to Book-dealers.

There is also an additional charge per annum, to cover foreign postage, of 75 cents for *Proceedings* and \$1 for *Transactions*, or 8 cents and 25 cents, respectively, for single numbers.

A special subscription rate has been fixed by the Board for the *Proceedings* of the Society for the benefit of Students in Technical Schools. This rate is \$4.50 per annum, and is available to any *bona fide* student of any technical school.

**Proceedings*, Vol. XXXIII, p. 20 (January, 1907); Vol. XXXVII, p. 28 (January, 1911).

LOCAL ASSOCIATIONS OF MEMBERS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

San Francisco Association

The San Francisco Association of Members of the American Society of Civil Engineers holds regular bi-monthly meetings, with banquet, and weekly informal luncheons. The former are held at 6 P. M., at the Palace Hotel, on the third Friday of February, April, June, August, October, November, and December, the last being the Annual Meeting of the Association.

Informal luncheons are held at 12.15 P. M. every Wednesday, and the place of meeting may be ascertained by communicating with the Secretary of the Association, E. T. Thurston, Jr., Assoc. M. Am. Soc. C. E., 713 Mechanics' Institute, 57 Post Street.

The by-laws of the Association provide for the extension of hospitality to any members of the Society who may be temporarily in San Francisco, and any such member will be gladly welcomed as a guest of the Association at any of the above meetings, if he will notify the Secretary that he is in San Francisco.

(Abstract of Minutes of Meeting)

December 16th, 1910.—The Annual Meeting was called to order; President Riffe in the chair; E. T. Thurston, Jr., Secretary; and present, also, 60 members and 5 guests.

On account of pressure of business, the matter relating to the Proposed Licensing of Engineers was laid over until the February meeting.

The Reports of the Secretary and Treasurer, respectively, were read, and the following officers were elected:

President, J. D. GALLOWAY.

Vice-President, JAMES H. WISE.

Secretary, E. T. THURSTON, JR.

Treasurer, P. E. HARROUN.

Sherman A. Jubb, Assoc. M. Am. Soc. C. E., addressed the meeting on the problem of rapid transit as presented in Boston, Mass., giving a detailed description of the construction of the Boston Subways, and illustrating his remarks with stereopticon views.

Adjourned.

Colorado Association

The meetings of the Colorado Association of Members of the American Society of Civil Engineers are held on the second Saturday of each month except July and August. The hour and place of meeting are not fixed, but this information will be furnished on application to the Secretary, H. J. Burt, M. Am. Soc. C. E., 1218 First National Bank Building, Denver, Colo. The meetings are usually preceded by an informal dinner.

Weekly luncheons are held on Wednesdays, and until further notice, will take place at The Colorado Traffic Club.

Visiting members are urged to attend the meetings and luncheons.

(Abstract of Minutes of Meeting)

February 11th, 1911.—The meeting was called to order at 8.30 P. M.; Vice-President C. W. Comstock in the chair; H. J. Burt, Secretary; and present, also, 22 members and 14 guests.

The minutes of the January meeting were read and approved.

A paper by Gavin N. Houston, M. Am. Soc. C. E., on "The Halligan Dam, A Reinforced Masonry Structure," was presented and illustrated with lantern slides, and the subject was discussed by a number of those present.

M. S. Ketchum, M. Am. Soc. C. E., discussed informally the paper by William Cain, M. Am. Soc. C. E., on "A Discussion of Experiments on Retaining Walls, and of Pressures on Tunnels," published in *Proceedings*, Am. Soc. C. E., for January, 1911.

Adjourned.

**PRIVILEGES OF ENGINEERING SOCIETIES
EXTENDED TO MEMBERS OF THE
AMERICAN SOCIETY OF CIVIL ENGINEERS**

Members of the American Society of Civil Engineers will be welcomed by the following Engineering Societies, both to the use of their Reading Rooms and at all Meetings:

American Institute of Mining Engineers, 29 West Thirty-ninth Street,
New York City.

Architekten-Verein zu Berlin, Wilhelmstrasse 92, Berlin W. 66,
Germany.

Associação dos Engenheiros Cíveis Portuguezes, Lisbon, Portugal.

Australasian Institute of Mining Engineers, Melbourne, Victoria,
Australia.

Boston Society of Civil Engineers, 715 Tremont Temple, Boston,
Mass.

Brooklyn Engineers' Club, 117 Remsen Street, Brooklyn, N. Y.

Canadian Society of Civil Engineers, 413 Dorchester Street, West,
Montreal, Que., Canada.

Civil Engineers' Society of St. Paul, St. Paul, Minn.

Cleveland Engineering Society, 718 Caxton Building, Cleveland,
Ohio.

Cleveland Institute of Engineers, Middlesbrough, England.

Colorado Association of Members, Am. Soc. C. E., H. J. Burt,
Secy., 1218 First National Bank Building, Denver, Colo.

Dansk Ingeniørforening, Amaliegade 38, Copenhagen, Denmark.

Engineers' and Architects' Club of Louisville, Ky., 303 Norton
Building, Fourth and Jefferson Streets, Louisville, Ky.

Engineers' Club of Baltimore, Baltimore, Md.

- Engineers' Club of Minneapolis**, 17 South Sixth Street, Minneapolis, Minn.
- Engineers' Club of Philadelphia**, 1317 Spruce Street, Philadelphia, Pa.
- Engineers' Club of St. Louis**, 3817 Olive Street, St. Louis, Mo.
- Engineers' Club of Toronto**, 96 King Street, West, Toronto, Ont., Canada.
- Engineers' Society of Pennsylvania**, 219 Market Street, Harrisburg, Pa.
- Engineers' Society of Western Pennsylvania**, 2511 Oliver Building, Pittsburg, Pa.
- Institute of Marine Engineers**, 58 Romford Road, Stratford, London, E., England.
- Institution of Engineers of the River Plate**, Buenos Aires, Argentine Republic.
- Institution of Naval Architects**, 5 Adelphi Terrace, London, W. C., England.
- Junior Institution of Engineers**, 39 Victoria Street, Westminster, S. W., London, England.
- Koninklijk Instituut van Ingenieurs**, The Hague, The Netherlands.
- Louisiana Engineering Society**, 321 Hibernia Bank Building, New Orleans, La.
- Memphis Engineering Society**, Memphis, Tenn.
- Midland Institute of Mining, Civil and Mechanical Engineers**, Sheffield, England.
- Montana Society of Engineers**, Butte, Montana.
- North of England Institute of Mining and Mechanical Engineers**, Newcastle-upon-Tyne, England.
- Oesterreichischer Ingenieur- und Architekten-Verein**, Eschenbachgasse 9, Vienna, Austria.
- Pacific Northwest Society of Engineers**, 803 Central Building, Seattle, Wash.
- Rochester Engineering Society**, Rochester, N. Y.
- Sachsischer Ingenieur- und Architekten-Verein**, Dresden, Germany.
- Sociedad Colombiana de Ingenieros**, Bogota, Colombia.
- Sociedad de Ingenieros del Peru**, Lima, Peru.
- Societe des Ingenieurs Civils de France**, 19 Rue Blanche, Paris, France.
- Society of Engineers**, 17 Victoria Street, Westminster, S. W., London, England.
- Svenska Teknologforeningen**, Brunkebergstorg 18, Stockholm, Sweden.
- Tekniske Forening**, Vestre Boulevard 18-1, Copenhagen, Denmark.
- Western Society of Engineers**, 1737 Monadnock Block, Chicago, Ill.

ACCESSIONS TO THE LIBRARY

(From February 7th to March 6th, 1911)

DONATIONS ***HYDRAULIC TURBINES**

Their Design and Installation. By Viktor Gelpke and A. H. Van Cleve, M. Am. Soc. C. E. Cloth, $9\frac{1}{2} \times 7\frac{1}{2}$ in., illus., 7 + 293 pp. New York and London, McGraw-Hill Book Company, 1911. \$4.00.

It is stated by the authors that this work is, to a large extent, a translation of a German book entitled "Turbinen und Turbinen Anlagen," by Viktor Gelpke. Certain portions of the earlier work have, however, been rewritten, the mathematical analysis has been simplified, the book rearranged, and Part III has been added. It is believed by the authors that this is the first book written in English which covers the entire subject of the correct mathematical design of all classes of turbine and impulse wheels. Part I gives a description of the various details used as turbine accessories in water-power development, the essential principles governing the same, and a classification and description of the several classes of turbines. In Part II appears the mathematical design of turbines of all types. Part III gives detailed descriptions of important and representative hydro-electric developments.

MECHANICS OF INTERNAL WORK.

(Or Work of Deformation) In Elastic Bodies and Systems In Equilibrium Including the Method of Least Work. By Irving P. Church, Assoc. Am. Soc. C. E. Cloth, $9\frac{1}{2} \times 6$ in., illus., 6 + 126 pp. New York, John Wiley & Sons; London, Chapman & Hall, Limited, 1910. \$1.50.

We are informed in the preface that this book is an attempt by the writer to prepare a text-book which should deal exclusively with the Mechanics of Internal Work in Elastic Bodies in Equilibrium and embody special fullness of explanation and illustration, not only in the demonstrations of the methods to be used, but also in the detail of the applications; and thus indicate clearly the use, scope, and limitations of these valuable methods. The Contents are: External and Internal Work of Elastic Structures; The Derivatives of Internal Work; The "Theorem of Least Work"; With Applications to Systems of Bars in Equilibrium Under Loads; Internal Work in Beams Under Flexure, Applications; Composite Systems and Curved Beams; Appendix; Index.

DROP FORGING, DIE SINKING AND MACHINE FORMING OF STEEL.

Modern Shop Practice, Processes, Methods, Machines, Tools and Details. By Joseph V. Woodworth. Cloth, $9\frac{1}{2} \times 6\frac{1}{2}$ in., illus., 341 pp. New York, The Norman W. Henley Publishing Co., 1911. \$2.50.

In a secondary title it is stated that this volume is a practical treatise on the hot and cold machine-forming of steel and iron into finished shapes, together with tools, dies, and machinery involved in the manufacture of duplicate forgings and interchangeable hot and cold pressed parts from bar and sheet metal. The author also states that the text is concise; that technical and ambiguous terms have been replaced by practical and familiar shop words; and that all illustrations and descriptions are plain and simple to understand and that the latter have been reduced to the simplest and fewest possible words so that the average mechanic may become familiar with advanced shop practice.

BACKBONE OF PERSPECTIVE.

By T. U. Taylor, M. Am. Soc. C. E. Cloth, $7\frac{1}{2} \times 4\frac{1}{2}$ in., illus., 56 pp. Chicago, The Myron C. Clark Publishing Company, 1910. \$1.00.

The author states that this book consists of notes given for many years in the form of lectures and drawing-board exercises, which have been reduced to print to save time in note-taking on the student's part. The Chapter Headings are: Primary Methods; Vanishing Point Method; Axometric Projections; Shades and Shadows.

* Unless otherwise specified, books in this list have been donated by the publishers.

TRANSPORTATION IN EUROPE.

By Logan G. McPherson. Cloth, 7½ x 5 in., 4 + 285 pp. New York, Henry Holt and Company, 1910. \$1.50.

In this volume the author's aim has been to present, in a broad outline, the conditions affecting transportation and traffic in Europe. The subject-matter is stated to be, in the main, a re-arrangement of the author's report to the National Waterways Commission, and is believed to contain all the necessary data on important topics. The statistics were obtained from official sources and the accounts of the existing status are based either on governmental publications, information received directly from those in charge of the administration of transportation agencies, or from leading men of affairs. As the author's investigations were concerned only with the economic aspects of the subject, no references are contained as to its mechanical and technical phases. The Contents are: Introductory; Land Roads and Interior Waterways; The Development of the Railways; Railway Passenger Tariffs; Railway Freight Tariffs; Concerning Freight-Traffic; International Rail Traffic; Phases of Governmental Control; Comparative Usefulness of Inland Waterways and Railways; Summary of the Situation on the Continent; Transportation in England; Index.

CONSERVATION BY SANITATION.

Air and Water Supply, Disposal of Waste (Including a Laboratory Guide for Sanitary Engineers). By Ellen H. Richards. Cloth, 9 x 6 in., illus., 12 + 305 pp. New York, John Wiley & Sons; London, Chapman & Hall, Limited, 1911. \$2.50.

This volume is stated to have been compiled from notes prepared for classes in sanitary engineering and to be primarily a laboratory guide, containing résumés of principles given in the lecture course which accompanies the training. It assumes familiarity with both the bacteriological and the chemical laboratory and access to an engineering library, and is intended as an aid to the student, as well as to the engineer and health officer who may not have had a full laboratory training in the subject. The Chapter Headings are: Part I, Air a Neglected Resource; Standards of Air Supply; Wholesome Air, and the Sanitary Inspector; Water Supplies; The Development of the Sanitary Idea as Indicated by the Municipalization of Water Works; Economic and Sanitary Efficiency of Water Works; Protection of Water Supplies as a Conservation of Natural Resources; The Regeneration (Renovation) of a Spoiled Watershed; The Interdependence of Town and Country; Filtration, When Resorted to, How Efficient; The Ultimate Disposal of Wastes Liable to Contaminate Water Supplies; Treatment of Various Wastes; The Community and the Individual. Part II, One Laboratory Exercise on the Inspection of Ventilation; Twelve Laboratory Exercises on the Examination of Water and Wastes; Index.

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The Speed and Power of Ships: A Manual of Marine Propulsion. D. W. Taylor. Vol. I, Text; Vol. II, Tables and Plates. John Wiley & Sons, New York; Chapman & Hall, Ltd., London, 1910.

Steam-Ships: The Story of Their Development to the Present Day. R. A. Fletcher. J. B. Lippincott Company, Philadelphia; Sidgwick & Jackson, Ltd., London, 1910.

Storage Battery Engineering: A Practical Treatise for Engineers. By Lamar Lyndon. Third Edition, Rewritten and Enlarged. McGraw-Hill Book Company, New York and London, 1911.

Iron and Steel (A Pocket Encyclopedia), Including Allied Industries and Sciences. By Hugh P. Tiemann. With an Introduction by Henry Marion Howe. McGraw-Hill Book Company, New York and London, 1910.

Compressed Air Plant: The Production, Transmission and Use of Compressed Air, with Special Reference to Mine Service. By Robert Peele. Second Edition, Revised and Enlarged. John Wiley & Sons, New York; Chapman & Hall, Limited, London, 1910.

Continuous Current Machine Design. By William Cramp. D. Van Nostrand Company, New York, 1910.

Notes on Irrigation Works. A Course of Lectures Delivered at Oxford Under the Auspices of the Common University Fund. By N. F. Mackenzie. D. Van Nostrand Company, New York, 1910.

Dynamo Electric Machinery; Its Construction, Design, and Operation; Direct-Current Machines, By Samuel Sheldon and Erich Hausmann. Eighth Edition, Completely Rewritten. D. Van Nostrand Company, New York; Crosby Lockwood & Son, 1910.

Mitteilungen über Forschungsarbeiten auf dem Gebiete des Ingenieurwesens, insbesondere aus den Laboratorien der technischen Hochschulen, herausgegeben vom Verein deutscher Ingenieure. Heft 97. Julius Springer, Berlin, 1911.

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 HOLMES, EDWIN MERRITT. Elected Junior, March 31st, 1903; Associate Member, January 2d, 1907; died February 11th, 1911.
 KELLOGG, ALBERT VICTOR. Elected Associate Member, November 6th, 1895; died February 15th, 1911.
 TÖNNESSEN, FRIDTHJOF LAURITZ MARTIN. Elected Associate Member, June 3d, 1908; date of death unknown.

Total Membership of the Society, March 7th, 1911,

5 898.

MONTHLY LIST OF RECENT ENGINEERING ARTICLES OF INTEREST

(February 4th to March 6th, 1911)

NOTE.—This list is published for the purpose of placing before the members of the Society the titles of current engineering articles, which can be referred to in any available engineering library, or can be procured by addressing the publication directly, the address and price being given wherever possible.

LIST OF PUBLICATIONS

In the subjoined list of articles, references are given by the number prefixed to each journal in this list:

- (1) *Journal*, Assoc. Eng. Soc., 31 Milk St., Boston, Mass., 30c.
- (2) *Proceedings*, Engrs. Club of Phila., 1317 Spruce St., Philadelphia, Pa.
- (3) *Journal*, Franklin Inst., Philadelphia, Pa., 50c.
- (4) *Journal*, Western Soc. of Engrs., Monadnock Blk., Chicago, Ill.
- (5) *Transactions*, Can. Soc. C. E., Montreal, Que., Canada.
- (6) *School of Mines Quarterly*, Columbia Univ., New York City, 50c.
- (8) *Stevens Institute Indicator*, Stevens Inst., Hoboken, N. J., 50c.
- (9) *Engineering Magazine*, New York City, 25c.
- (10) *Cassier's Magazine*, New York City, 25c.
- (11) *Engineering* (London), W. H. Wiley, New York City, 25c.
- (12) *The Engineer* (London), International News Co., New York City, 35c.
- (13) *Engineering News*, New York City, 15c.
- (14) *Engineering Record*, New York City, 12c.
- (15) *Railway Age Gazette*, New York City, 15c.
- (16) *Engineering and Mining Journal*, New York City, 15c.
- (17) *Electric Railway Journal*, New York City, 10c.
- (18) *Railway and Engineering Review*, Chicago, Ill., 10c.
- (19) *Scientific American Supplement*, New York City, 10c.
- (20) *Iron Age*, New York City, 10c.
- (21) *Railway Engineer*, London, England, 25c.
- (22) *Iron and Coal Trades Review*, London, England, 25c.
- (23) *Bulletin*, American Iron and Steel Assoc., Philadelphia, Pa.
- (24) *American Gas Light Journal*, New York City, 10c.
- (25) *American Engineer*, New York City, 20c.
- (26) *Electrical Review*, London, England.
- (27) *Electrical World*, New York City, 10c.
- (28) *Journal*, New England Water-Works Assoc., Boston, Mass., \$1.
- (29) *Journal*, Royal Society of Arts, London, England, 15c.
- (30) *Annales des Travaux Publics de Belgique*, Brussels, Belgium.
- (31) *Annales de l'Assoc. des Ing. Sortis des Ecoles Spéciales de Gand*, Brussels, Belgium.
- (32) *Mémoires et Compte Rendu des Travaux*, Soc. Ing. Civ. de France, Paris, France.
- (33) *Le Génie Civil*, Paris, France.
- (34) *Portefeuille Economiques des Machines*, Paris, France.
- (35) *Nouvelles Annales de la Construction*, Paris, France.
- (37) *Revue de Mécanique*, Paris, France.
- (38) *Revue Générale des Chemins de Fer et des Tramways*, Paris, France.
- (41) *Modern Machinery*, Chicago, Ill., 10c.
- (42) *Proceedings*, Am. Inst. Elec. Engrs., New York City, 50c.
- (43) *Annales des Ponts et Chaussées*, Paris, France.
- (44) *Journal*, Military Service Institution, Governors Island, New York Harbor, 50c.
- (45) *Mines and Minerals*, Scranton, Pa., 20c.
- (46) *Scientific American*, New York City, 8c.
- (47) *Mechanical Engineer*, Manchester, England.
- (48) *Zeitschrift*, Verein Deutscher Ingenieure, Berlin, Germany.
- (49) *Zeitschrift für Bauwesen*, Berlin, Germany.
- (50) *Stahl und Eisen*, Düsseldorf, Germany.
- (51) *Deutsche Bauzeitung*, Berlin, Germany.
- (52) *Rigasche Industrie-Zeitung*, Riga, Russia.
- (53) *Zeitschrift*, Oesterreichischer Ingenieur und Architekten Verein, Vienna, Austria.
- (54) *Transactions*, Am. Soc. C. E., New York City, \$4.
- (55) *Transactions*, Am. Soc. M. E., New York City, \$10.
- (56) *Transactions*, Am. Inst. Min. Engrs., New York City, \$5.

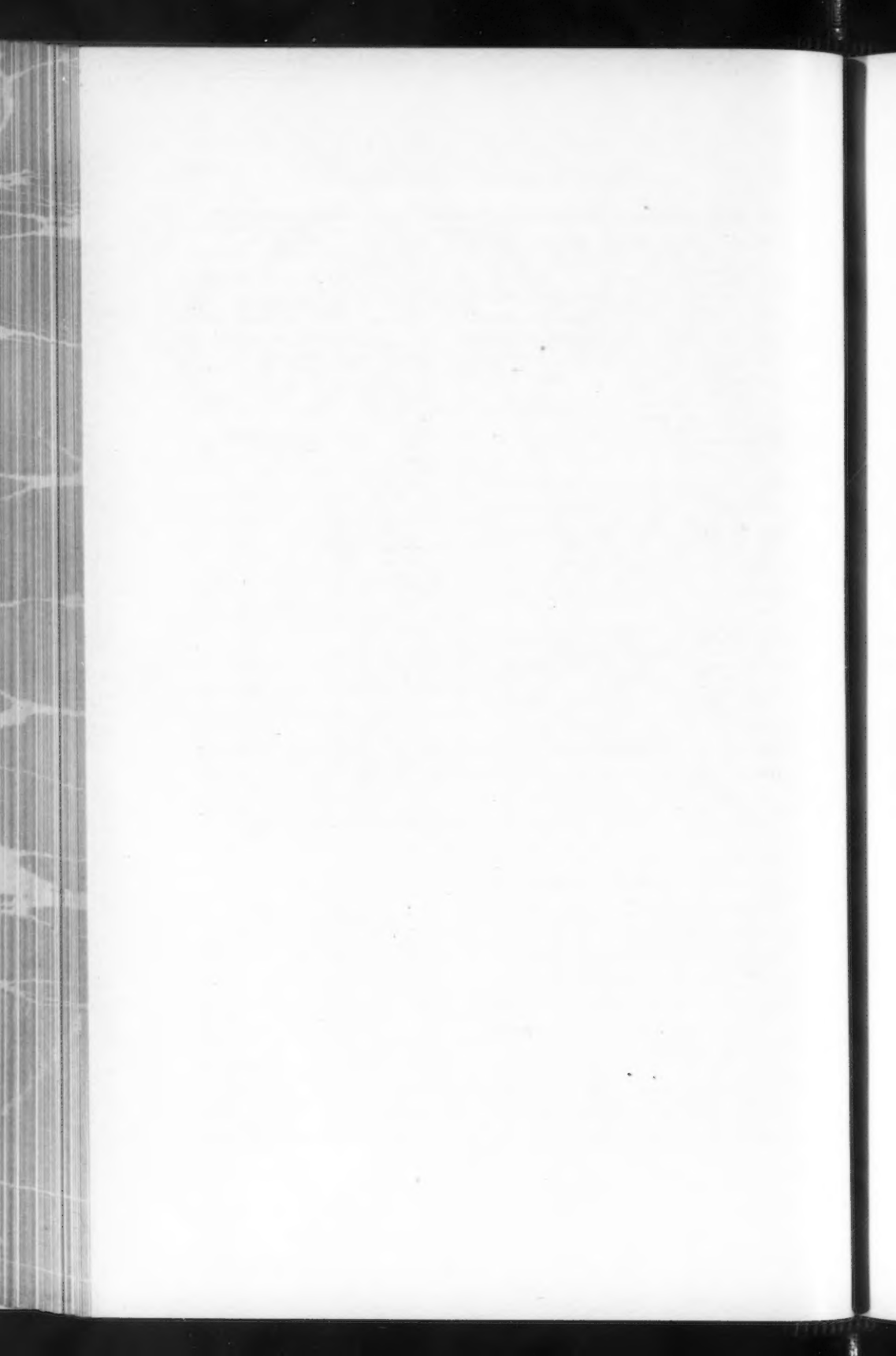
- (57) *Colliery Guardian*, London, England.
 (58) *Proceedings*, Engrs.' Soc. W. Pa., 803 Fulton Bldg., Pittsburg, Pa., 50c.
 (59) *Transactions*, Mining Inst. of Scotland, London and Newcastle-upon-Tyne, England.
 (60) *Municipal Engineering*, Indianapolis, Ind., 25c.
 (61) *Proceedings*, Western Railway Club, 225 Dearborn St., Chicago, Ill., 25c.
 (62) *Industrial World*, 59 Ninth St., Pittsburg, Pa.
 (63) *Minutes of Proceedings*, Inst. C. E., London, England.
 (64) *Power*, New York City, 20c.
 (65) *Official Proceedings*, New York Railroad Club, Brooklyn, N. Y., 15c.
 (66) *Journal of Gas Lighting*, London, England, 15c.
 (67) *Cement and Engineering News*, Chicago, Ill., 25c.
 (68) *Mining Journal*, London, England.
 (70) *Engineering Review*, New York City, 10c.
 (71) *Journal*, Iron and Steel Inst., London, England.
 (71a) *Carnegie Scholarship Memoirs*, Iron and Steel Inst., London, England.
 (73) *Electrician*, London, England, 18c.
 (74) *Transactions*, Inst. of Min. and Metal., London, England.
 (75) *Proceedings*, Inst. of Mech. Engrs., London, England.
 (76) *Brick*, Chicago, Ill., 10c.
 (77) *Journal*, Inst. Elec. Engrs., London, England.
 (78) *Beton und Eisen*, Vienna, Austria.
 (79) *Forscherarbeiten*, Vienna, Austria.
 (80) *Tonindustrie Zeitung*, Berlin, Germany.
 (81) *Zeitschrift für Architektur und Ingenieurwesen*, Wiesbaden, Germany.
 (83) *Progressive Age*, New York City, 15c.
 (84) *Le Ciment*, Paris, France.
 (85) *Proceedings*, Am. Ry. Eng. and M. of W. Assoc., Chicago, Ill.
 (86) *Engineering-Contracting*, Chicago, Ill., 10c.
 (87) *Roadmaster and Foreman*, Chicago, Ill., 10c.
 (88) *Bulletin of the International Ry. Congress Assoc.*, Brussels, Belgium.
 (89) *Proceedings*, Am. Soc. for Testing Materials, Philadelphia, Pa.
 (90) *Transactions*, Inst. of Naval Archts., London, England.
 (91) *Transactions*, Soc. Naval Archts. and Marine Engrs., New York City.
 (92) *Bulletin*, Soc. d'Encouragement pour l'Industrie Nationale, Paris, France.
 (93) *Revue de Métallurgie*, Paris, France, 4 fr. 50.
 (94) *The Boiler Maker*, New York City, 10c.
 (95) *International Marine Engineering*, New York City, 20c.
 (96) *Canadian Engineer*, Toronto, Ont., Canada, 15c.
 (97) *Turbine*, Berlin, Germany, 1 Mark.
 (98) *Journal*, Engrs. Soc. Pa., 219 Market St., Harrisburg, Pa., 30c.
 (99) *Proceedings*, Am. Soc. of Municipal Improvements, New York City, \$1.50.
 (100) *Professional Memoirs*, Corps of Engrs., U. S. A., Washington, D. C., \$1.
 (101) *Metal Worker*, New York City, 10c.
 (102) *Organ für die Fortschritte des Eisenbahnwesens*, Wiesbaden, Germany.
 (103) *Mining and Scientific Press*, San Francisco, Cal., 10c.
 (104) *The Surveyor and Municipal and County Engineer*, London, England, 6d.
 (105) *Metallurgical and Chemical Engineering*, New York City, 25c.

LIST OF ARTICLES.

Bridges.

- A Shallow-Floor Concrete Girder Bridge.* C. L. Slocum, Assoc. M. Am. Soc. C. E. (14) Feb. 4.
 The Salisbury Viaduct.* (14) Feb. 11.
 Designing Concrete Abutments for Steel Highway Bridges.* H. E. Bilger. (Abstract of paper read before the Ill. Soc. of Engrs. and Survs.) (13) Feb. 16; (86) Feb. 15.
 A Large Series of Full-Sized Eye-Bar Tests.* (13) Feb. 16.
 A Through Reinforced-Concrete Arch Bridge.* E. A. Gast. (13) Feb. 16.
 Bridge Work on the Western Maryland Extension.* George L. Fowler. (15) Feb. 17.
 The Grafton Bridge at Auckland, New Zealand.* Walter E. Bush. (14) Feb. 13.
 A Difficult Double Track Skew Crossing.* (14) Feb. 18.
 The Fifth Avenue Viaduct at Seattle.* (14) Feb. 18.
 Methods and Cost of Reinforcing a Steel Bridge with Concrete.* (86) Feb. 22.
 The Hackensack River Bridge Piers.* (14) Feb. 25.
 The Beaver Bridge Main Post and Rocker Bearing.* (14) Feb. 25.
 Building a Concrete Bridge under Difficult Conditions.* W. M. Denman. (14) Feb. 25.

* Illustrated.



Bridges—(Continued).

- Arch-Bridge with Sidewalks through the Abutments.* (14) Feb. 25.
 Remplacement de Ponts Inférieure en Fonte par des Ponts en Poutrelles Enrobées.*
 M. Balling. (38) Feb.
 Zeichnerisches Verfahren zur Ermittlung der Einflusslinien des eingespannten
 Bogens.* Chr. Vlachos. (78) Serial beginning Jan. 18.
 Die Eisenbetonbogenbrücken der Eisenbahnlinie Klaus-Agonitz.* (53) Serial be-
 ginning Jan. 20.
 Beitrag zur Bewertung der Wiegebrücke.* L. Schaller. (48) Jan. 28.
 Beitrag zur Berechnung eingespannter Bogen.* F. Baumstark. (78) Serial be-
 ginning Feb. 1.
 Fussgängerbrücke über die Poststrasse in Myslowitz O.-Schl.* Egil Magelssen.
 (78) Feb. 1.
 Frankreichs Brücken im Städtebild.* Chr. Klalber. (51) Feb. 8.
 Die Talbrücken der Nebenbahn Schorndorf, Welzheim.* Jori und Schächterle.
 (78) Serial beginning Feb. 13.

Electrical.

- High-Tension Testing of Insulating Materials.* A. B. Hendricks, Jr. (42)
 Feb.
 Surging of Synchronous Machines.* Ernst J. Berg. (4) Feb.
 Oil-Break Circuit Breakers.* E. B. Merriam. (42) Feb.
 Voltage Regulation of Generators.* H. A. Laycock. (42) Feb.
 The Regulation of Distributing Transformers.* C. E. Allen. (42) Feb.
 Economic Limitations to Aggregation of Power Systems.* Robert A. Philip. (42)
 Feb.
 Electric Light and Water-Works Plant at Holland, Mich.* (27) Feb. 2.
 Oil-Fuel Generating Station and 1200-Volt Direct-Current Substation at Fruit-
 vale, Cal.* (27) Feb. 2.
 Power Networks. J. R. Dick. (73) Feb. 3.
 The Measurement of Energy Losses in Condensers Traversed by High-Frequency
 Electric Oscillations. J. A. Fleming and G. B. Dyke. (Abstract of paper
 read before the Physical Soc.) (73) Feb. 3.
 Hand Controllers for Multi-Speed Induction Motors.* R. H. Fenkhausen. (64)
 Feb. 7.
 The Design of Induction Motors.* W. E. Highfield and R. Livingstone. (Paper
 read before the Dick, Kerr Eng. Soc.) (73) Feb. 10.
 Electricity in the Machine Shop.* C. W. Johnson. (Paper read before the Metal
 Trades Superintendents and Foremen's Club.) (47) Feb. 10.
 New Station of the San Joaquin Light & Power Company.* G. S. Hewins. (14)
 Feb. 11.
 Station of the Middletown (Conn.) Electric Light Company.* (27) Feb. 16.
 Relative Efficiency of Light Production by Constant Temperature and Variable
 Temperature Incandescent Lamp Filaments.* Evan J. Edwards. (27)
 Feb. 16.
 An Alternator for Direct Production of Electric Waves for Wireless Telegraphy.*
 R. Goldschmidt. (73) Feb. 17.
 An Apparatus for the Measurement of Alternate Currents by the Compensation
 Method. A. Larsen. (Abstract from *Elek. Zeit.*) (73) Feb. 17.
 Some Observations on the Attack of Poles by Woodpeckers.* Howard F. Weiss.
 (13) Feb. 23.
 Specifications and Tests for Insulating Tape. William P. Munger. (27) Feb. 23.
 Electric Service Around Chicago.* (27) Feb. 23.
 A Method for Studying the Internal Inductance of Linear Conductors.* Frank F.
 Fowle. (27) Feb. 23.
 Protection of Electrical Transmission Lines.* E. E. F. Creighton. (42) Mar.
 Tests of Grounded Phase Protector on the 44 000-Volt System of the Southern
 Power Company.* C. I. Burkholder and R. H. Marvin. (42) Mar.
 Reinforced-Concrete Electric-Lamp Poles for St. Marys Falls Canal, Michigan.*
 L. C. Sabin, M. Am. Soc. C. E. (13) Mar. 2.
 Fixation de l'Azote Atmosphérique au Moyen de l'Électricité.* Ph. Ouspensky.
 (31) 1910, Pt. 4.
 Lampe Électrique à Vapeur de Mercure, Système Silica à Brûleur en Quartz.*
 Maurice Leblanc, fils. (33) Jan. 21.
 Les Progrès Récents de la Télégraphie sans Fil en France et à l'Étranger.* (33)
 Serial beginning Feb. 4.

Marine.

- Proposed Applications of Electric Ship Propulsion.* W. L. R. Emmet. (42)
 Feb.
 Clyde and Tyne Shipyard Extensions.* (12) Serial beginning Feb. 10.
 Das moderne Unterseeboot.* H. Vogel. (48) Serial beginning Feb. 18.

*Illustrated.

Mechanical.

- An Autographic Rubber-Testing Machine.* Thorsten Y. Olsen. (89) Vol. 10.
 A New Machine for Testing Pitch.* Thorsten Y. Olsen. (89) Vol. 10.
 Comparative Tests of Lime Mortar, Both in Tension and Compression; Hydrated Lime and Sand; Lump Lime and Sand; Cement-Lime and Sand.* E. W. Lazell. (89) Vol. 10.
 A Comparison of Magnetic Permmeters.* Charles W. Burrows. (89) Vol. 10.
 Improved Instruments for the Physical Testing of Bituminous Materials.* Herbert Abraham. (89) Vol. 10.
 The Scleroscope. Albert F. Shore. (89) Vol. 10.
 The 600 000-lb. Hydraulic Testing Machine of the University of Wisconsin and its Calibration.* H. F. Moore and M. O. Withey. (89) Vol. 10.
 Necessary Reforms in Specifications for Petroleum Products. Albert Sommer. (89) Vol. 10.
 Some Testing-Laboratory Accessories.* J. M. Porter. (89) Vol. 10.
 Apparatus for Repeated Loads on Concrete Cylinders and a Typical Result.* H. C. Berry. (89) Vol. 10.
 Report of Comm. on Standard Tests for Lubricants. (Amer. Soc. for Testing Materials.)* (89) Vol. 10.
 Some Applications of Electricity in the Iron and Steel Industries.* Brent Wiley. (98) Jan.
 Gas Fires and Chimney Flues.* E. W. Browning. (Paper read before the London and Southern District Junior Gas Assoc.) (66) Jan. 31.
 Properties of Dry, Saturated and Unsaturated Air with Application to Cooling-Tower and Evaporative Surface Condenser Calculations. George Frederick Gebhardt. (3) Feb.
 Improvements in Transportation Equipment, Panama Canal. (87) Feb.
 Methods and Costs of Unloading Railway Rails. D. A. Wallace. (87) Feb.
 Cutting With the Oxy-Acetylene Torch.* J. F. Springer. (94) Feb.; (25) Feb.
 Suggestions for Making Dimensions of Boilers Standard. Geo. R. Richardson. (Paper read before the Amer. Inst. of Steam Boiler Inspectors.) (94) Feb.
 Short Talk on Refractories. H. A. Phillips. (76) Feb. 1.
 Steam Turbines vs. Producer Gas Engines. (96) Feb. 2.
 Hydraulic Hoists on a New Principle.* (47) Feb. 3.
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 The Brimsdown Metal-Filament Lamp Works.* (26) Feb. 3.
 16 Horse-Power Motor Car With Self-Starting Gear.* (11) Feb. 3.
 Autogenous Welding By Means Of Oxy-Acetylene Blow Pipes. J. A. Warfel. (Abstract of paper read before Technischer Verein of Pittsburgh.) (62) Feb. 6.
 Boilers and Piping of Wieboldt Bldg.* Osborn Monnett. (64) Feb. 7.
 The Steam Turbine in Germany.* F. E. Junge and E. Heinrich. (64) Feb. 7.
 The "Automaton" Lamplighter.* (66) Feb. 7.
 The Chemical Control of Gas-Works. John T. Sheard. (Paper read before the Manchester and District Junior Gas Assoc.) (66) Feb. 7.
 Layout and Operation of a Cement Drain Tile Plant.* C. M. Powell. (Paper read before Nat. Assoc. Cement Users.) (86) Feb. 8.
 The Detroit Stoker: A New Automatic Coal Feeding Device.* (20) Feb. 9.
 Congressional Power Plant at Washington.* M. C. Turpin. (27) Feb. 9.
 The "Michell" Footstep and Thrust Bearings.* T. Campbell Puters. (57) Feb. 10.
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 The No. 4 Universal Portland Cement Mill. (14) Feb. 11.
 Modern Boiler Plant, Holyoke, Mass.* Warren O. Rogers. (64) Feb. 14.
 Firing Boilers With Pulverized Coal.* W. S. Worth. (64) Feb. 14.
 Practical Hints on Retort-Settings and Appliances Connected Therewith.* T. Brooke. (Paper read before the Midland Jun. Gas Eng. Assoc.) (66) Feb. 14.
 Gas Plant in the City of Mexico.* C. D. Lamson. (83) Feb. 15.
 Motors for Driving Main Rolls of Mills.* (20) Feb. 16.
 The Muddle "Selector" for the Separation of Fine Material.* (13) Feb. 16.
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 Draining Compressed Air. Frank Richards. (14) Feb. 18.
 Use of Oil in Zinc Smelters, Successfully Substituted for Gas at Joplin. (62) Feb. 20.
 The Browning Railroad Ditcher: A Versatile Machine. (62) Feb. 20.
 Efficiency of Live Steam Feed Heater.* A. H. Gibson. (64) Feb. 21.
 Rating of Gas and Water Undertakings, With an Outline of General Procedure Outside the Metropolis. Arthur Valon, Assoc. M. Inst. C. E. (66) Serial beginning Feb. 21.
 Recent Motor Trucks; their Adaptability to Contractors' Haulage.* (86) Feb. 22.
 The Browning Pile Driver.* (20) Feb. 23.

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Mechanical—(Continued).

- Use of Flywheel Set to Equalize Ore-Dock Loads on Central-Station System.* (27) Feb. 23.
- The Air-Compressor Plant for Driving the Moodna Siphon on the New York Aqueduct. (Abstract from *Mine and Quarry*.) (13) Feb. 23.
- Excavating Machinery for Ditching and Trenching.* E. E. R. Trautman, Assoc. M. Am. Soc. C. E. (Abstract of paper read before the Ill. Soc. of Engrs. and Survs.) (13) Feb. 23.
- A Pneumatic Ash-Handling System.* (17) Feb. 25.
- Additions to Hartford Power Plant.* H. R. Callaway. (64) Feb. 28.
- Dissipation of Heat From Self-Cooled, Oil Filled Transformer Tanks.* J. J. Frank and H. O. Stephens. (42) Mar.
- A Monorail Grab Bucket Coal Hoist.* (20) Mar. 2.
- Washing Dust and Smoke from Chimney Gases at York, England.* John C. B. Kershaw. (13) Mar. 2.
- Canadian Pacific Grain Elevator.* (15) Mar. 3.
- La Turbine à Vapeur Melms-Pfennlinger.* Ch. Dantin. (33) Jan. 28.
- Les Progrès de l'Automobilisme en 1910.* F. Drouin. (33) Serial beginning Jan. 28.
- Rapport sur le Compresseur d'Air de M. Delsuc. (92) Dec.
- Sur le Calcul et l'Etude des Aéroplanes.* R. Tison. (37) Jan. 31.
- Ueber einige Begleiterscheinungen beim Betrieb von Dampfturbinen.* Kröner. (97) Serial beginning Jan. 20.
- Ueber den Antrieb von Kreiselwipern.* (53) Serial beginning Jan. 20.
- Sicherheitsventil zwischen Wasserleitung und Windkessel der Wasserkranen.* Chr. Ph. Schäfer. (102) Feb. 1.
- Verbindung einer Hängebahnanlage mit einer Kupolofen-Begichtungseinrichtung.* Ernst A. Schott. (50) Feb. 2.
- Versuche an einen 4000 pferdigen elektrisch angetriebenen Turbinenkompressor der Bauart Pokorney & Wittekind.* Langer. (48) Feb. 4.
- Die Konstruktion praktisch vollkommener Francislaufräder; Ein Ergebnis der Strömungsuntersuchung in verschauelten Rotationshohlräumen.* Hugo Marschner. (97) Feb. 5.
- Ueber ein neues Gasreinigungsverfahren.* Friedrich Müller. (50) Feb. 9.
- Abdampfverwertungsanlagen.* Grunewald. (48) Serial beginning Feb. 11.
- Rohisenmischer und ihre Anwendung im Eisenhüttenbetriebe.* Oscar Simmersbach. (50) Feb. 16.
- Achsenregler mit während des Betriebes zu bedienender Verstellung der Umlaufzahl.* Karl Kaiser. (48) Serial beginning Feb. 18.

Metallurgical.

- The Welding of Blowholes in Steel.* Henry M. Howe. (89) Vol. 10.
- Further Notes on the Annealing of Steel.* William Campbell. (89) Vol. 10.
- The Influence of Titanium on Segregation in Bessemer-Rail Steel.* G. B. Waterhouse. (89) Vol. 10.
- Apparatus for the Microscopical Examination of Metals. Albert Sauveur. (89) Vol. 10.
- Recent Cyanide Practice at the Montezuma, Costa Rica.* S. F. Shaw. (103) Jan. 28.
- Crushing at Cyanide Plants. Mark R. Lamb. (16) Feb. 4.
- A New Critical Point in Copper-Zinc Alloys.* H. C. H. Carpenter and C. A. Edwards. (Paper read before the Inst. of Metals.) (11) Feb. 10.
- An Improved Zinc-Dust Feeder.* Claude T. Rice. (16) Feb. 18.
- Cyanide Treatment of Concentrates.* (16) Feb. 18.
- Upward Leaching of Sand (Cyanide Plants). H. T. Durant. (16) Feb. 25.
- Les Alliages Pseudo-Binaïres.* A. Portevin. (93) Jan.
- Synthèse du Fer Météorique.* Carl Benedicks. (93) Jan.
- Recherche sur les Gaz Occlus Contenus dans les Alliages de Cuivre.* G. Guillemin et B. Delachanal. (93) Jan.
- L'Utilisation de la Chaleur dans les Fours et Procédés Métallurgiques. B. Pomerantz. (93) Feb.
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- Principles of Electric Blasting.* W. G. Hudson. (45) Feb.
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- Steel Supports in Coal Mines.* R. B. Woodworth, M. Am. Soc. C. E. (45) Feb.

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- Coal Mine Transportation.* E. B. W. (45) Feb.
 The Siphon in Mining.* J. T. Beard. (45) Feb.
 Underground Signalling from Power or Lighting Mains.* (22) Feb. 3.
 Electric Power in Collieries. James Miller. (Paper read before the Rugby Eng. Soc.) (47) Feb. 3.
 The Holden Tunnel at Tintic.* Edward R. Zalinski. (16) Feb. 4.
 Sluicing at the Kolchan Mines, East Siberia.* Chester W. Purington. (103) Serial beginning Feb. 4.
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 Electric Pumping Problem.* Max J. Welch. (103) Feb. 11.
 Empire Mines Cyanide Plant.* Frank C. Landguth. (103) Feb. 11.
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 Notes on the Rand Gold Mines. Robert Peele. (16) Feb. 11.
 Air Currents and Shaft Plumb Lines.* George C. McFarlane. (16) Feb. 11.
 The Use of Electricity in Mines. (Report of Dept. Comm. of Great Britain.) (73) Feb. 17; (57) Feb. 17.
 The Electrification of the Underground Machinery at Trimdon Grange Colliery.* Simon Tate. (Paper read before the North of England Inst. of Min. and Mech. Engrs.) (22) Feb. 17.
 Increasing Efficiency of Labor Underground in Transvaal. (86) Feb. 22.
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 Hindered Settling Classifiers.* Robert H. Richards. (16) Feb. 25.
 Sampling Placer Ground.* J. P. Hutchins and N. C. Stines. (103) Feb. 25.
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 Notes on Mine Sampling.* Glenn Anderson. (16) Mar. 4.
 Insulation of Cables in Mines. Sydney F. Walker. (16) Mar. 4.
 Le Dragage de l'Or en Guyane Française.* Léon Delvaux. (33) Feb. 4.

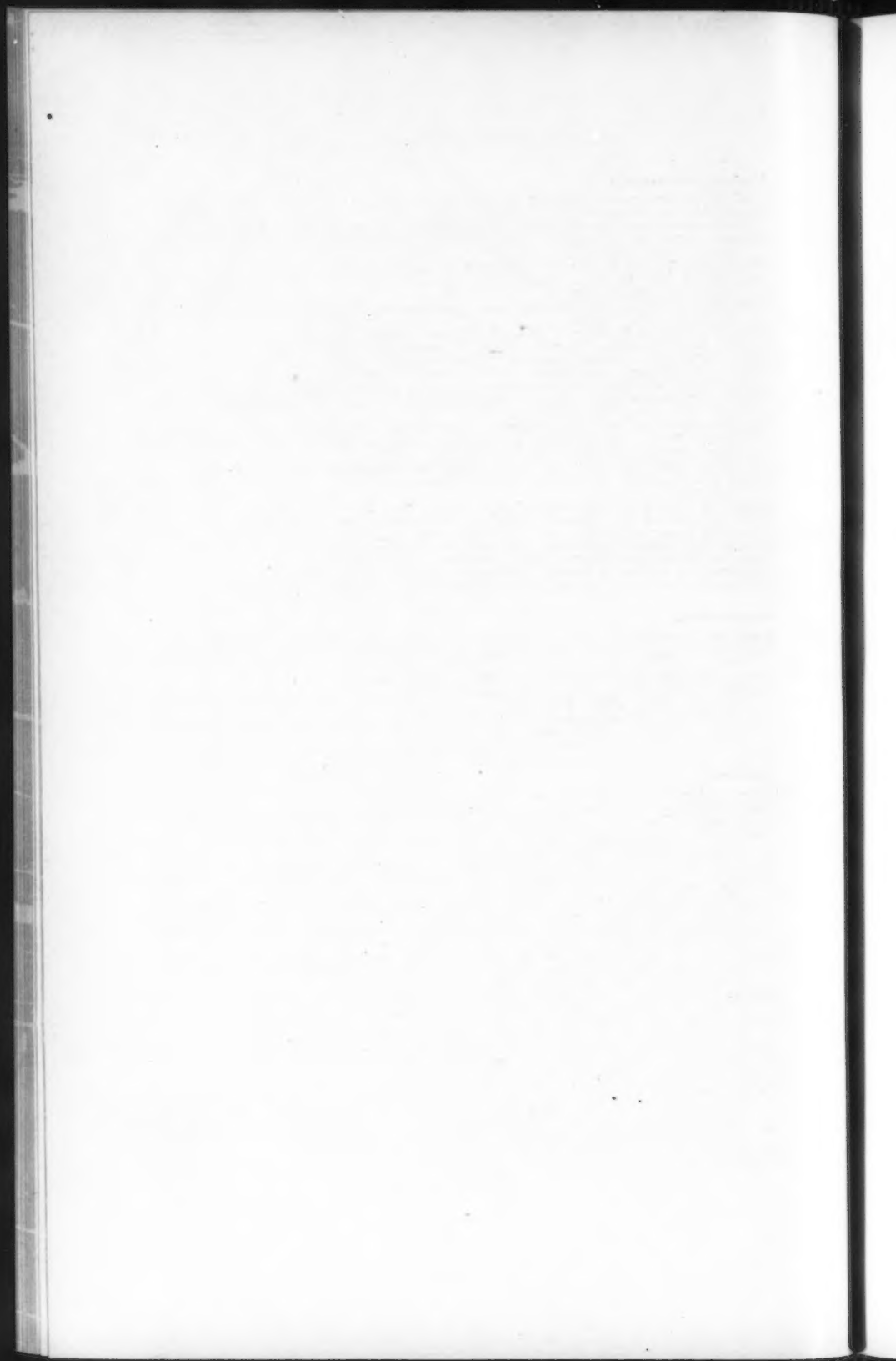
Miscellaneous.

- Simplicity in the Measures of Physical Quantities. Carl Hering. (3) Feb.
 The Use of Diagrams for Solving Engineering Formulæ.* Gordon F. Dodge. (4) Feb.
 Depreciation of Buildings and Machinery. (14) Feb. 11.
 Methods and Cost of Filling by Hydraulic Dredging; Lincoln Park Extension, Chicago, Ill.* (86) Feb. 22.
 The Work of a Forest Engineer.* A. H. D. Ross. (Paper read before the Engrs. Club, Toronto.) (96) Feb. 23.
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 The Relation Between Modern Traffic and the Alignment and Profile in Highway Design. Henry B. Drowne. (Paper read before the Amer. Assoc. of Sci.) (86) Feb. 8.
 Definitions and Discussion of Various Bituminous Materials used in Road Construction and Maintenance. (86) Feb. 8.
 A Comparison of English and American Traffic Regulations. Arthur H. Blanchard and Henry B. Drowne. (104) Feb. 10.
 Meadow Roads as Constructed in Southern New Jersey Counties. E. D. Rightmire. (Paper read before the New Jersey State Association of County Engineers.) (13) Feb. 9; (14) Feb. 11.
 Method and Cost of Constructing a Macadam Road in Fine Grained Loose Soil Subject to Erratic Drainage Conditions.* (86) Feb. 15.
 Methods and Cost of Constructing an Asphalt Surface Drive and Novel Form of Concrete Curb in Lincoln Park, Chicago.* (86) Feb. 15.
 Cracking of Cement Grouted Brick Pavements, Causes and Remedies. Earle R. Whitmore. (Paper read before the Mich. Eng. Soc.) (86) Feb. 15.
 Report on London Traffic.* (12) Feb. 17.
 Experimental Work of the Illinois Highway Commission in the Use of Bituminous Compounds in Macadam and Earth Road Construction.* T. R. Agg. (Paper read before the Ill. Soc. of Engrs. and Survs.) (86) Feb. 22; (13) Mar. 2.
 The Collinsville and East St. Louis Road.* A. N. Johnson. (Paper read before the Ill. Soc. of Engrs. and Survs.) (14) Feb. 25.
 Concrete Pavements in Kansas City, Mo. (14) Feb. 25.

*Illustrated.



Municipal--(Continued).

- Method of Taking Traffic Census on Highways. Arthur H. Blanchard, M. Am. Soc. C. E., and Irving W. Patterson, Jun. Am. Soc. C. E. (Paper read before the Amer. Assoc. for the Advancement of Sci.) (13) Mar. 2; (104) Feb. 17.
- Arguments for Bituminous-Bound Macadam Built by the Penetration Method. T. Warren Allen. (14) Mar. 4.
- Döberitzer Heerstrasse.* Frey. (49) Pt. 1-3.

Railroads.

- Vermillion Paint for Railway Signals: Results of an Investigation. Robert Job. (89) Vol. 10.
- Unevenly Chilled and Untrue Car Wheels.* Thomas D. West. (89) Vol. 10.
- Low-Carbon Streaks in Open-Hearth Rails.* M. H. Wickhorst. (89) Vol. 10.
- Elongation and Ductility Tests of Rail Sections Under the Manufacturers' Standard Drop-Testing Machine.* P. H. Dudley. (89) Vol. 10.
- Standardization of Chilled Iron Car Wheels With Reference to Service Conditions.* W. S. Killam. (61) Jan.
- Air Hose Failures.* R. W. Burnett. (25) Feb.
- General Lay-Out for a Modern Locomotive Repair Plant.* H. H. Maxfield. (65) Feb.
- The Water Supply of a Great Railway.* Hewitt Beames. (21) Feb.
- New Cylinder Arrangement for Locomotives; Northern of France Railway.* Charles R. King. M. I. C. E. (21) Feb.
- New Self-Discharging Hopper Ballast Car.* (25) Feb.
- New Frisco Locomotive for Pusher Service.* (25) Feb.
- The General Oil House of the Santa Fe.* (25) Feb.
- 4-6-2 Locomotive for Chicago and Northwestern Trainshed of the New Northwestern Passenger Station at Chicago.* (87) Feb.
- Permanent Way of the Central South African Railways.* (21) Feb.
- Methods and Costs of Unloading Railway Rails. D. A. Wallace. (87) Feb.
- New "Pacific" Type Compound Locomotive; State Railways of France.* (21) Feb.
- The Top Heading and Bottom Heading Methods of Attack in Tunnel Construction.* (87) Feb.
- The Belgian Method of Testing Locomotives While Running.* Joseph Doyen. (88) Feb.
- Note on the General Adoption of Certain Essential Signalling Principles.* L. Kohlfürst. (88) Feb.
- The Electrification Problem on Trunk-Line Railways. A. D. Williams. (9) Feb.
- Manganese Crossings for Steam Railways.* (87) Feb.
- Feed-Water Heating on Locomotives.* (11) Serial beginning Feb. 3.
- Live Steam Feed Heating (Locomotives). A. H. Gibson. (12) Feb. 3.
- A Discussion of the Depreciation Problem with Particular Reference to Electric Railways. William B. Jackson. (86) Feb. 8.
- Four-Cylinder Compound Locomotive, Chemin de Fer du Nord.* (12) Feb. 10.
- Cumberland-Connellsville Connection of the Western Maryland.* George L. Fowler. (15) Feb. 10.
- Mallet Locomotive With Articulated Boiler Rebuilt From Old Power.* M. H. Haig. (15) Feb. 10.
- Improvements on the Lehigh Valley Transit System.* (17) Feb. 11.
- The Physical Valuation of Railroads in South Dakota. (14) Feb. 11.
- The Bergen-Christiania Railway, A Recently Completed Scandinavian Line.* (19) Feb. 11.
- Pan-American Railway. (18) Feb. 11.
- Electric Car Lighting. D. F. Crawford. (19) Feb. 11.
- Pacific Type Superheater Locomotive; Chicago & North Western.* (15) Feb. 17.
- Performance of 4-Cylinder Balanced Simple Locomotive With Superheater. (47) Feb. 17.
- Recent Progress in Air Brake Apparatus. S. W. Dudley. (Abstract from *Electric Journal*.) (18) Feb. 18.
- Recent Progress in Car Painting. F. A. Elmquist. (17) Feb. 18.
- Steel Frame Box Cars.* (18) Feb. 18.
- Results of Tie Preservation and Methods of Keeping Records.* F. J. Angier. (Abstract of paper read before the Wood Preservers' Assoc.) (18) Feb. 18.
- A Remarkable High Power Electric Locomotive.* (19) Feb. 18.
- Trainshed of the New Northwestern Passenger Station at Chicago.* (86) Feb. 22.
- The Depreciation Problem. William B. Jackson. (96) Feb. 23.
- Prentice Wireless Train Control.* (96) Feb. 23.
- Baton Rouge Cut-Off; Southern Pacific.* (15) Feb. 24.
- Mallet Locomotives on the Santa Fe.* (15) Feb. 24.
- Belt Lines of the Chicago & North Western at Chicago and Milwaukee.* (15) Feb. 24.
- Superheated Steam in Locomotive Service. W. F. M. Goss. (Paper read before the Am. Ry. Master Mechanics' Assoc.) (15) Feb. 24.

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Railroads—(Continued).

- Locomotive Valve Lubrication.* W. O. Taylor. (Abstract of paper read before the Central Ry. Club.) (18) Feb. 25.
- Tunnel Ventilation.* Arthur Ritter. (70) Mar.
- Freight Train Resistance: Its Relation to Average Car Weight. Edward C. Schmidt. (Abstract from *Bul.*, Univ. of Ill.) (86) Mar. 1.
- Shop Improvements at Huntington, W. Va.; Chesapeake & Ohio.* (15) Mar. 3.
- Havana Passenger Station.* (15) Mar. 3.
- Indianapolis, New Castle & Toledo Electric Railway.* Paul H. White. (17) Mar. 4.
- Rail Corrugations.* K. Sieber. (17) Mar. 4.
- Ventilation of the Hudson Tunnels. (14) Mar. 4.
- The Electrification of the Hoosac Tunnel. (14) Mar. 4.
- Limites de Flexibilité des Ressorts et Limites de Vitesses du Matériel des Chemins de Fer.* Georges Marié. (32) Nov.
- Chemin de Fer du Yunnan (Chine); Consolidation d'une "Brèche" au km. 94.820.* Dufour. (43) Nov.
- Ligne de Moutiers à Bourg-Saint-Maurice, Note sur le Souterrain de la Saucette.* V. Guillermin. (43) Nov.
- Rapports sur le Freinage à Main des Trains de la Compagnie du Midi et sur les Modifications à Apporter aux Règles de Freinage Établies par la Circulaire Ministérielle du 6 juillet 1901.* M. F. Maison. (43) Nov.
- Le Chemin de Fer du Yunnan (Chine).* A. Le Vergnier. (33) Jan. 21.
- Locomotive à Adhérence Supplémentaire, Système Hanscotte; Chemin de Fer de Clermont-Ferrand au Puy-de-Dôme.* (35) Feb.
- Entstäubungsanlagen für Personenwagen.* C. Guillery. (102) Jan. 15.
- Vorrichtung zum Verladen von Lokomotivasche. Keller. (102) Feb. 1.
- Fahrbahnabfestigung auf Wegübergängen in Schienenhöhe.* Sandkamp. (102) Feb. 1.
- Neuere Erscheinungen im Lokomotivbau nach der Ausstellung von St. Louis (1904). Stockert. (53) Feb. 3.
- Die selbsttätige Scharfenberg-Kuppelung.* Sausse. (102) Feb. 15.

Railroads, Street.

- Elevated Railways of Chicago.* (21) Feb.
- City Transportation Problems: A Report by Bion J. Arnold on the Pittsburg Situation. (13) Feb. 9; (17) Feb. 11.
- Transition Curves in Tramway Tracks.* John A. Main. (11) Feb. 10.
- Snow-Fighting Equipment for the Brooklyn Rapid Transit System.* (17) Feb. 11.
- Automatic Block Signals for Electric Railways.* W. K. Howe. (Abstract of paper read before the Public Service Comm.) (17) Feb. 11.
- Transportation in the Pittsburgh District.* (14) Feb. 11.
- Recommended Plan and Estimates of Cost for a Passenger Subway System for the City of Chicago.* Bion J. Arnold. (Abstract of Report to City Council). (86) Feb. 15.
- The Proposed Subway System for Chicago.* (13) Feb. 23.
- The Simultaneous Installation of Seven High-Tension Submarine Cables.* (17) Feb. 25.
- Method and Cost of Street Railway Track Reconstruction with Carnegie Steel Ties in Concrete.* J. C. Lathrop. (86) Mar. 1.
- Renewals as Defined by the Board of Supervising Engineers; Chicago Traction. (17) Mar. 4.
- Die elektrische Untergrundbahn der Stadt Schöneberg.* (49) Pt. 1-3.

Sanitation.

- Disinfection of Sewage and Sewage Filter Effluents. Earle B. Phelps. (Paper read before the Boston Soc. of Civ. Engrs.) (1) Jan.
- Sanitary Drinking Fountains.* (70) Feb.
- Sprinkling Filter Plant for Suburban Community.* Paul Hansen, Assoc. M. Am. Soc. C. E. (From *Municipal Journal and Engineer*.) (96) Feb. 2.
- The Installation of an Incinerator. J. A. Stewart. (96) Feb. 2.
- Typical Soil Stack Tests in Washington.* A. R. McGonegal. (101) Feb. 4.
- A Recommended Design for and Method of Constructing and Operating a Sewage Disposal Plant for Private Houses.* (86) Feb. 8.
- Specifications for and Cost of Concrete Sewer Pipe at Bellingham, Wash. H. A. Whitney. (86) Feb. 8.
- Ventilation in Cotton Mills.* (11) Feb. 10.
- The Classification of Sewer Trench Excavation. (14) Feb. 11.
- Cost of Constructing Reinforced Concrete Pipe Sewers at Mishawaka, Ind. William P. Moore. (Paper read before the Ind. Eng. Soc.) (86) Feb. 15.
- Heating the Post-Office at Danville, Ill.* (101) Feb. 18.
- Sewage Disposal at Ohio State Tuberculosis Hospital.* Paul Hansen. (14) Feb. 18.

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Sanitation—(Continued).

- The Apportionment of the Cost of Construction and Maintenance of the Massachusetts Metropolitan Sewerage, Park and Water Systems. J. Albert Holmes. (13) Feb. 23.
- Standard Tests for Sewer Pipe. (14) Feb. 25.
- Standards for Cast Iron Soil Pipe and Fittings.* (101) Feb. 25.
- Drainage Improvements at Syracuse.* (14) Feb. 25.
- Reclaiming the Everglades.* Day Allen Willey. (10) Mar.
- A Study of Underground Insulation (Heating Plants). C. H. Staten. (Paper read before the Nat. Dist. Heating Assoc.) (70) Mar.
- The St. Francis Valley Drainage Project with Estimates of Cost and Data on Costs of Ditching by Various Methods. Arthur E. Morgan and O. G. Baxter. (Abstract from *Bul.*, U. S. Office Exper. Sta.) (86) Mar. 1.
- Standard Tests of Drain Tile and Sewer Pipe. A. Marston and A. O. Anderson. (Abstract of paper read before the Iowa Eng. Soc.) (13) Mar. 2.
- The Main Intercepting Sewer at Syracuse.* (14) Mar. 4.
- Die Müllverwertung und Müllverbrennung.* S. Bourdot. (52) Jan. 15.
- Ueber die Anwendung von Faulräumen.* Rudolf Hauptner. (78) Jan. 18.

Structural.

- Standard Specifications for Staybolt Iron. (Amer. Soc. for Testing Materials.) (89) Vol. 10.
- Report of Committee on Preservative Coatings for Structural Materials. (89) Vol. 10.
- Aluminates: Their Properties and Possibilities in Cement Manufacture. Henry S. Spackman. (89) Vol. 10.
- A Sand Specification and Its Specific Application. W. A. Aiken. (89) Vol. 10.
- The Effect of Sodium Silicate Mixed With or Applied to Concrete. Albert Moyer. (89) Vol. 10.
- The Determination of Soluble Bitumen. Prevost Hubbard and C. S. Reeve. (89) Vol. 10.
- Tests of Cast-Iron Arbitration Test Bars. C. D. Mathews. (89) Vol. 10.
- An Investigation of the Distribution of Stress in Reinforced Concrete Beams, Including a Comparative Study of Plain Concrete in Tension and Compression.* A. T. Goldbeck. (89) Vol. 10.
- Some Exposure Tests of Structural Steel Coatings.* C. M. Chapman. (89) Vol. 10.
- Test of a Structural-Steel Plate Partly Fused by a Short-Circuited Electric Current.* A. W. Carpenter. (89) Vol. 10.
- Tests of Steel and Wrought-Iron Beams.* H. F. Moore. (89) Vol. 10.
- Strength of Steel From T-Beams.* E. L. Hancock. (89) Vol. 10.
- Tests of Reinforced Concrete Columns Subjected to Repeated and Eccentric Loads.* M. O. Withey. (89) Vol. 10.
- Cupro-Nickel Steel. G. H. Clamer. (89) Vol. 10.
- Copper-Clad Steel: Its Metallurgy, Properties and Uses.* Wirt Tassin. (89) Vol. 10.
- The Classification of Fine Particles According to Size. G. W. Thompson. (89) Vol. 10.
- Report of Comm. on the Corrosion of Iron and Steel. (Amer. Soc. for Testing Materials.) (89) Vol. 10.
- Modern Machine Shops and Industrial Plants.* Charles Day. (9) Feb.
- Wind Loads on Mill Building Bents.* Albert Smith. (4) Feb.
- The Handling of Concrete During Cold Weather.* J. H. Chubb. (67) Feb.
- Cement Stucco Exteriors.* (67) Feb.
- Examples of Simple and Efficient Cement and Steel Fireproof Construction.* H. M. Nangle. (67) Feb.
- Some Tests on White Anti-Friction Bearing Metals.* C. Alfred M. Smith. (Paper read before the Inst. of Metals.) (11) Feb. 3.
- Temporary Balconies in Madison Square Garden Arena.* (14) Feb. 4.
- Building for the General Electric Company, Toledo.* (14) Feb. 4.
- Tests to Determine the Relationship Between Density and Strength of Mortar. R. P. Davis. (Abstract from *Cornell Civil Engineer.*) (86) Feb. 8.
- Design and Computations for a Cellular Reinforced Concrete Dam.* George J. Bancroft. (Abstract of paper read before the Col. Sci. Soc.) (96) Feb. 9.
- The Strength of Piers or Columns of Different Materials. (13) Feb. 9.
- Concrete Pile Foundations in Drilled Holes.* (13) Feb. 9.
- Shop Floors, the Materials Employed and the Methods of Construction Best Adapted to Various Uses and Conditions.* H. M. Lane. (20) Serial beginning Feb. 9.
- Depreciation of Buildings and Machinery. H. F. Donaldson. (Paper read before the Junior Inst. of Engrs.) (47) Serial beginning Feb. 10.
- Corrosion of Alloys.* John Rhodin. (12) Feb. 10.
- The Evolution of Fire-Resisting Construction. William Woodward. (Extract from paper read before the Surveyors' Inst.) (104) Feb. 10.

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Structural—(Continued).

- Nomenclature of Iron and Steel. Henry M. Howe. (16) Serial beginning Feb. 11.
- Substructure, Steelwork and Columns of the Bankers Trust Building.* (14) Feb. 11.
- Sheet Metal Work on Concrete Buildings.* (101) Feb. 11.
- Feasibility of Grouping Timbers for Treatment. W. F. Goltra. (Paper read before the Wood Preservers' Assoc.) (18) Feb. 11.
- Construction of a Reinforced Concrete Tank for a Gasholder.* V. L. Elbert. (Paper read before the Amer. Gas Institute.) (24) Feb. 13.
- An Investigation in the Change of Volume of Concrete During the Hardening Period. C. W. Okey and W. H. Leckliter. (Abstract from *Bul. 5*, Iowa State College Eng. Exper. Sta.) (86) Feb. 15.
- The Comparative Cost of a House of Brick of Moderate Size When Constructed of Wood, Brick, Cement, or Hollow Block.* J. Parker B. Fiske. (Paper read before National Brick Manufacturers' Assoc.) (76) Feb. 15.
- Depositing Concrete by Gravity Chutes for Building Construction. (13) Feb. 16.
- The Naval Dirigible Balloon Shed.* (12) Feb. 17.
- Testing Foundations at the Municipal Building, New York.* (14) Feb. 18.
- New Foundations for the Old Boston Custom House.* (14) Feb. 18.
- Tensile Tests of Large Concrete Specimens. A. P. Mills. (Abstract from *Cornell Civil Engineer*). (14) Feb. 18.
- Tests of Reinforced-Concrete Columns with Various Kinds of Transverse Reinforcement.* (From *Concrete and Constructional Engineering*). (13) Feb. 23.
- Further Notes on the Collapse of the Henke Reinforced-Concrete Building.* Alexis Saurbrey. (13) Feb. 23.
- Over-Driven Piles, Brooklyn Fourth Avenue Subway Construction.* S. P. Brown, M. Am. Soc. C. E. (13) Feb. 23.
- The Grain Elevator of the Grand Trunk Pacific Ry. at Fort William (Ont.) Canada.* (13) Feb. 23.
- The Kempsmith Mfg. Company's New Plant.* (20) Feb. 23.
- The East River Savings Building.* (14) Feb. 25.
- Tests of Soft Soap for Waterproofing Concrete.* (14) Feb. 25.
- A Reinforced Concrete Grain Elevator at St. Boniface.* (14) Mar. 4.
- Scenery Storehouses for the Zurich Municipal Theatre. (14) Mar. 4.
- Steel Pile Driver Leads.* (14) Mar. 4.
- Double-Pitched Roof Built with Concrete Members.* (14) Mar. 4.
- Pièces Chargées de Bout. M. Vierendeel. (31) 1910, Pt. 4.
- Note pour le Calcul des Poutres en Beton Armé.* Delemer. (43) Nov.
- Essai des Métaux par l'Etude de l'Amortissement des Mouvements Vibratoires. A. Boudouard. (92) Dec.
- Usure des Aciers aux Abrasifs.* M. F. Robin. (93) Jan.
- La Constitution du Ciment. W. Michaelis. (84) Jan.
- Traitements Thermiques et Mécaniques des Métaux à l'Atelier.* F. Robin et P. Gartner. (37) Serial beginning Jan. 31.
- Die Biegungslinie des Stabwerträgers.* A. Grube. (49) Pt. 1-3.
- Der Konstruktive Aufbau der Lutherkirche zu Worms a. Rh.* Steinberger. (78) Jan. 18.
- Eisenbetonschornsteine.* (78) Jan. 18.
- Die Herstellung der Metallschläuche in der Metallschlauchfabrik Pforzheim vorm. Hch. Witzmann G. m. b. H.* Wilhelm Theobald. (48) Serial beginning Jan. 21.
- Konstruktion der Grossmarkthalle am Südbahnhof München.* B. Rueb, A. Keller and Leonh. Moll. (51) Serial beginning Jan. 28.
- Ueber eben gekrümmte stabförmige Körper aus Material mit veränderlicher Dehnungszahl, ihre Beanspruchung und Formänderung.* R. Baumann. (48) Jan. 28.
- Moderne Schornsteine aus Eisenbeton.* Frank C. Perkins. (78) Feb. 1.
- Prüfungen mit Beton. Buchartz. (78) Feb. 1.
- Ueber den Einfluss des Mangans auf die Eigenschaften des Flusseisens.* Georg Läng. (50) Feb. 2.
- Untersuchung und Begutachtung der Mörtel. (80) Feb. 11.
- Konzessionspflicht der Betonbauunternehmungen. Alfred Kubatz. (78) Feb. 13.
- Zur statischen Berechnung von Eisenbetonträgern System Vierendeel.* H. Metzger. (78) Feb. 13.
- Zu den Fragen der Frostwirkung im Beton. Gerhard Neumann. (78) Feb. 13.
- Die Berechnung kontinuierlicher Deckenplatten nach den ministeriellen Vorschriften.* G. Kaufmann. (78) Feb. 13.
- Die Hydraulizität des Ziegelmehles. Kehle. (80) Feb. 14.
- Zur Statik der Stockwerkrahmen. Rich. Wuczkowski. (53) Feb. 17.

Water Supply.

- Sterilization of Public Water Supplies. George A. Johnson. (Paper read before the Boston Soc. of Civ. Engrs.) (1) Jan.
- The Water Supply of Marseilles, and Trials of Filtering and Sterilizing Apparatus.* Walter Clemence, M. I. Mech. E. (11) Serial beginning Jan. 27.

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Water Supply—(Continued).

- The Water Supply of a Great Railway.* Hewitt Beames. (21) Feb.
 High Pressure Water Service for Fire Protection.* J. B. Sando. (4) Feb.
 Rating of Gas and Water Undertakings With an Outline of General Procedure Outside the Metropolis. Arthur Valon, Assoc. M. Inst. C. E. (66) Serial beginning Feb. 2.
 Some Features of Design of Infiltration Plants. Philip Burgess. (Paper read before the Ohio Eng. Soc.) (14) Feb. 4.
 Power Development on the North Fork of the San Joaquin River.* G. S. Hewins, M. Am. Soc. C. E. (14) Feb. 4.
 Hypochlorite Treatment of the Omaha Water Supply. Jay Craven. (14) Feb. 4.
 The Project of the Costilla Estates Development Company.* W. D. Waltman, Assoc. M. Am. Soc. C. E. (14) Feb. 4.
 The Construction of the Buffalo Water-Works Tunnel and Intake Crib.* C. H. Hollingsworth. (13) Feb. 9.
 Hydraulic Pipe Scraping. Harry Blackadder. (104) Feb. 10.
 Mechanical Filters at Bolton.* (12) Feb. 10.
 A Temporary Water Disinfecting Plant at Brainerd.* Frederic Bass, Assoc. M. Am. Soc. C. E. (14) Feb. 11.
 Hydraulic Power Works on Lake Joux, Switzerland.* William F. Johnston. (14) Feb. 11.
 The Construction of Browns Reservoir. (14) Feb. 11.
 Valuation of the Physical Property of the Peoria Water Co., with a Discussion of Rate Making and of Reasonable Rates. (86) Feb. 15.
 Irrigation by Pumping Individual Wells with Power from a Central Gas-Producer Gas-Engine Electric Generating Station. Robert P. Woods, M. Am. Soc. C. E. (Abstract of paper read before the Ind. Eng. Soc.) (86) Feb. 15.
 Hydro-Electric Power Development at Revelstoke, B. C.* (96) Feb. 16.
 A Pumping-Irrigation Project with a Central Power Plant.* Robert P. Woods, M. Am. Soc. C. E. (Abstract of paper read before the Ind. Eng. Soc.) (13) Feb. 16.
 Reinforced-Concrete Pressure Pipe on the Umatilla Project, Ore., U. S. Reclamation Service.* Herbert D. Newell, Assoc. M. Am. Soc. C. E. (13) Feb. 16.
 Surface Water Supplies for Small Communities. Albert P. I. Cotterell, M. Inst. C. E. (Paper read before the Royal Sanitary Inst.) (104) Serial beginning Feb. 17.
 A New Apparatus for Cleaning Sand Filters.* (11) Feb. 17.
 Irrigation Works in Mesopotamia. W. H. Wheeler, M. Inst. C. E. (12) Feb. 17.
 A Reinforced Concrete Reservoir at Kensington, Conn.* Arthur W. Bacon, Assoc. M. Am. Soc. C. E. (14) Feb. 18.
 A High-Pressure Fire System for Boston. (Report of Comm. of the National Board of Fire Underwriters.) (14) Feb. 18.
 Modern Deluge Sets for Fire Extinguishing Service.* Frank C. Perkins. (19) Feb. 18.
 A Unique Gas Power Pumping Plant.* Osborn Monnett. (64) Feb. 21.
 Water Analysis and the Public Health. D. C. Revell. (Paper read before the Union of Alberta Municipalities.) (96) Feb. 23.
 The Western Canada Power Company's Stave Falls Development.* A. R. MacKenzie. (14) Feb. 25.
 Droughts and Stream Flow in Pennsylvania. Farley Gannett. (14) Feb. 25.
 Extent and Composition of the Incrustation on some Filter Sands. E. Bartow and C. E. Millar. (From *Journal of Industrial and Engineering Chemistry*). (86) Mar. 1.
 A Concrete Reservoir Built on Soft Ground.* (14) Mar. 4.
 The Evolution of a Pumping Station.* Theodore A. Leisen. (Paper read before the Ind. Eng. Soc.) (14) Mar. 4.
 Water-Power Plants and the Type Characteristics of Turbines.* N. Baashuus. (13) Mar. 2.
 Water Waste Surveys in Chicago. T. C. Phillips. (Abstract of paper read before the Ill. Water Supply Assoc.) (13) Mar. 2; (14) Mar. 4.
 An Iron Removal Plant for a Private Estate.* (14) Mar. 4.
 The Hound Chute Plant of the Cobalt Power Company.* A. Vonaesch. (14) Mar. 4.
 Relation of Intakes to Pure Water from the Great Lakes. Charles B. Burdick. (Paper read before the Ill. Water Supply Assoc.) (14) Mar. 4.
 An Automobile Water Tower.* Herbert T. Wade. (46) Mar. 4.
 The Purchase, Setting and Testing of Water Meters. Edward W. Bemis. (14) Mar. 4.
 Les Glaces dans les Usines Hydrauliques. Hoc. (33) Serial beginning Jan. 21.
 Neuere Ausführungen von Wasserbehältern in Eisenbeton.* M. Mateescu. (78) Serial beginning Jan. 18.
 Zementröhren in Elsass-Lothringen.* (80) Jan. 21.
 Beitrag zur statischen Berechnung von Talsperren.* Ramisch. (53) Serial beginning Feb. 10.
 Innere Vorgänge in strömenden Flüssigkeiten und Gasen.* I. Isaachsen. (48) Serial beginning Feb. 11.

*Illustrated.



Waterways.

- Work at the Panama Canal. Louis K. Rourke. (Paper read before the Boston Soc. Civ. Engrs.) (1) Jan.
- The Improvement of the Port of London.* (11) Feb. 3; (12) Serial beginning Feb. 3.
- A New Ore Dock and Storage Yard at Toledo.* (14) Feb. 11.
- Improvement of the Port Facilities of Philadelphia. (13) Feb. 16.
- The Construction Plant for Gatun Locks and Gatun Dam.* Edward Schildhauer and Ernest Eugene Lee. (13) Feb. 16.
- The Necessity of Longer Piers for the Port of New York.* Calvin Tomkins. (46) Feb. 18.
- Methods and Costs of Constructing Stone Filled Timber Breakwater, Lincoln Park Extension, Chicago.* (86) Feb. 22.
- Construction Costs on the Panama Canal for the Last Three Months of 1910. (86) Feb. 22.
- Recent Unit Prices on the Panama Canal. (14) Feb. 25.
- The Waterway from Chicago to the Mississippi. (14) Feb. 25.
- The Conklingville Reservoir Project and the Permanent Gaging Station on the Sacandaga River near Hadley, N. Y.* C. C. Covert, Assoc. M. Am. Soc. C. E. and D. R. Cooper, Assoc. M. Am. Soc. C. E. (13) Mar. 2.
- Terminals for Water-Borne Freight.* H. McL. Harding. (10) Mar.
- Methods and Cost of Hydraulic Excavation on the Panama Canal.* (86) Mar. 1.
- Improvement of Port Facilities at Kobe Harbor, Japan. H. McL. Harding, Assoc. Am. Inst. Elec. E. (13) Mar. 2.
- Nouvelle Application du Cordeau Détonant aux Travaux Publics.* L. Barthélemy. (32) Nov.
- Etanchements des Canaux par Rideaux de Béton dans les Digue.* M. Galliot. (43) Nov.
- Les Agrandissements du Port d'Anvers, Construction du Tronçon Sud du Bassin-Canal et des Deux Darses Correspondantes.* (33) Jan. 28.
- Die Kanalisierung des Neckars von Mannheim bis Heilbronn. (51) Feb. 8.
- Ueber die Anwendung von Eisenbetonschwimmkästen zur Herstellung von Kai-mauern.* F. W. Otto Schulze. (78) Feb. 13.

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